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Analysing entrepreneurship education: a bibliometric survey pattern

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Abstract

Entrepreneurship education is an evolving field that confronts obstacles due to fragmentation issues and eclectic approaches that have to be resolved utilising robust educational theories and tools able to intrude effectively the entrepreneurial research discourse. Entrepreneurial learning is also the outcome of education and an unequivocal component of theorising about entrepreneurship. Based on explanatory bibliometric techniques, the present study examines, for the first time, how these terms have emerged in the extant entrepreneurship literature since eighties. A set of 7726 abstracts, retrieved from the SCOPUS database, is analysed through (key)word frequencies, co-occurrence networks and citations. Quantitative findings verify the customary picture for entrepreneurship education that exhibits low academic citation and loose connections with learning theories. The present data also reveal that the connection of entrepreneurship with lifelong learning settings, vocational training and career counselling is scarce in literature. Other 'gaps' in research pertain to the comprehensive examination of experiential learning, advanced learning processes and education for innovation. The quantitatively identified shortage of the previous research topics is crucial for the future development of the field of entrepreneurship. Implications concern educational researchers in the field of entrepreneurship, educational agencies or policies as well as academic publishers.

Keywords: Entrepreneurship, Entrepreneurship education, Entrepreneurial learning, Lifelong learning, Scientometrics, Bibliometrics

Background

How learning becomes an entrepreneurship component? Unequivocally, it underlies everyday activity of entrepreneurs and it also motivates entrepreneurship education. Ten years ago, Jason Cope (2005) discussed entrepreneurship as a learning process concluding that "further research may reveal entirely new dimensions of learning in entrepreneurial contexts and more interdisciplinary, in-depth empirical work is a vital part of this (i.e. entrepreneurial) theory-building process". Following Cope's perspective, entrepreneurial learning can be thought as a fundamental pole not only for conventional but for innovative entrepreneurship as well (e.g. Kakouris and Ketikidis 2012). In parallel, the wide provision of entrepreneurship education, emerging from relevant educational policies, fares a more 'mature' phase after the initial '*fostering entrepreneurial mindsets*' period (e.g. Katz 2003; Kuratko 2005; Oslo Agenda 2006). Currently, the impact of educational programmes and the induced entrepreneurial learning, i.e. the outcome of entrepreneurial courses, have become pivotal issues and

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are being investigated (e.g. Fayolle 2013). For example, a cross-country survey about the impact of entrepreneurial courses worldwide is performed through the Entrepreneurship Education Project at Illinois State University (Vanevenhoven and Liguori 2013). Similar surveys appear in the European Education Area as well (e.g. European Commission 2012a; PACE project).[1]

Entrepreneurship education, i.e. the systematic provision of entrepreneurship programmes from educational organisations, has been associated with educational policies, guidelines and surveys in Europe.[2] These documents refer to the provision of entrepreneurial courses in different educational levels and target groups. Notably, entrepreneurship has been included amongst the eight key-competencies to be fostered through lifelong learning across Europe (European Commission 2007). Thus, there are on-going plans to promote entrepreneurship in secondary schools, in university faculties – different than Business Schools, in vocational training and in lifelong learning settings.[3] A wide provision of entrepreneurial courses requires a full consideration of the intrinsic learners' needs, the perceived 'targets' and goals of educational agencies, the promoted theoretical background of the relevant courses, appropriate teaching models and other aspects in order to attain impact on trainees. As entrepreneurship education expands, corresponding learning becomes central and under certain circumstances a profound and transformative process (e.g. Cope 2003; Kakouris 2015; Neergaard et al. 2012). Therefore, a more concise confrontation with different underlying learning theories and methods is needed (Hannon 2006).

Given the rapid rise of entrepreneurship education and especially entrepreneurial learning as a targeted outcome of it and as an everyday practice of entrepreneurs or enterprising organisations, the present work aims, as a first attempt, to reveal how these notions have been introduced, addressed and discussed in the extant literature during the last decades. It also aims to quantitatively measure the citation that relevant articles attain through the time. The rest of this article is organised as follows: firstly the theoretical framework and the research hypotheses are formulated, secondly the methodology is presented and then the quantitative results are discussed. We refer the present approximation as 'a first attempt' because education and learning is an extensive and distinct scientific field that can be hardly confronted in a single article. However, the lack of relevant quantitative research able to map the current academic status and use of the two previous concepts within a new and evolving field as entrepreneurship, mandates the present effort in order to contribute those scholars who either build entrepreneurial pedagogies and courses (e.g. Pittaway and Cope 2007; Fayolle 2013) or study real-life entrepreneurship as a learning process (e.g. Cope 2005; Politis 2005).

Theoretical framework and research hypotheses

Landrstöm and colleagues (e.g. Landström 2005; Cornelius et al. 2006; Landström and Lohrke 2010; Landström et al. 2012) have introduced bibliometric methods to reveal the knowledge base of the entrepreneurship field. The scholars divide the relevant literature in three distinct periods with different characteristics: the early 80s, the 90s and the 'front end' which starts just after the millennium. Their longitudinal study reveals the 'core' entrepreneurship documents and their users but confronts the notion of entrepreneurship and not its specific topics, as entrepreneurship education. Notably, education and educational research has been a subject area of works citing the

entrepreneurship knowledge base along the three decades with a higher ranking position in 80s. Recently, Meyer et al. (2014) provided a state of the art scientometric analysis based on Thomson Reuters' Web of Science (WoS) for the emergence of entrepreneurship as a research field. The authors identify five distinct clusters for corresponding entrepreneurial concepts: *cognitive aspects of entrepreneurship, demographic and personality determinants of entrepreneurship, theoretical perspectives on entrepreneurship, entrepreneurial and innovation finance and eclectic approaches on entrepreneurship*. Notably, neither education nor learning fall within a certain cluster. Education only appears in the first cluster (i.e. cognitive aspects of entrepreneurship) associated with start-ups and the notion of the entrepreneurial university. This first cluster is related to the third one (i.e. theoretical perspectives of entrepreneurship) while learning is absent as a distinct keyword in the 'core' literature. Accordingly, evidence for education and learning is expected sparse within the entrepreneurial literature. The present work uses similar quantitative bibliometric methods focused on the emergence of education and learning within the entrepreneurship literature.

It has been well documented that entrepreneurship education is not irrelevant to governmental policies and expectations. Entrepreneurship is thought as a means for employability, a motor for endogenous economic development and a crucial feature of developed, knowledge-driven economies. Therefore, a common goal of worldwide educational agencies is to inspire, through entrepreneurship education, entrepreneurial intention or orientation to graduates. Hence, it is straightforward that the increase of entrepreneurship courses is expected to lead to an increase in the number of start-ups. Since the age at which people decide to become entrepreneurs significantly varies (Degeorge and Fayolle 2011), entrepreneurship education is not restricted to higher education. It can be thought connected with vocational training, career counselling and adult education obtaining an inclusive character. Therefore, different teaching methods and different types of learning may intrude the entrepreneurial curricula (e.g. Hannon 2006; Kakouris 2015). Concerning the aims and scope of entrepreneurship education, the following research hypothesis will be bibliometrically tested:

H1: Entrepreneurship education has been connected with entrepreneurial intention, vocational training and lifelong learning.

As a matter of fact, entrepreneurship education has stemmed out from Business Schools and it has been largely promoted in higher education. Through a meta-analysis, Blenker et al. (2014) found that almost half of the existent entrepreneurship education literature comes from UK. The scholars discuss the research methods adopted in entrepreneurship education research and they note that the field is fragmented in both content and methods. Fayolle (2013) draws similar conclusions for entrepreneurial teaching. An expected result from the previous ascertainment is that entrepreneurship education is expected to receive less citation compared with other subjects of entrepreneurship. The emerging pattern for state of the art entrepreneurial teaching indicates that the spectrum of underlying practices is wide and requires rigorous research from the educational perspective, innovative practices, assessment and further academic integration. Hence, the second research hypotheses set for the present work can be articulated as follows:

H2a: There is a significant amount of educational research within the domain of entrepreneurship.

H2b: Entrepreneurship education is expected to form a distinct cluster in word-association patterns, where keywords as: higher education, learning, university, intention are expected to appear.

H2c: Entrepreneurship education literature receives less citation rates compared with the rest topics of entrepreneurship research.

Entrepreneurial learning is the targeted outcome of education and also a certain component for understanding and theorising about real life business venturing. The first causal relation between education and learning has been clearly stated in a recent EU report entitled 'Rethinking Education Strategy" (European Commission 2012b) while the second occurs during the lifetime of an entrepreneur and has been described in literature (e.g. Minniti and Bygrave 2001; Cope 2005; Politis 2005). Recently, Neergaard et al. (2012) summarise four different epistemological perspectives for entrepreneurial learning that are currently adopted from educators and vary from the behavioural to the existential domain. The authors note that pedagogical interventions have to be more grounded on educational psychology theories and the educators have to reflect on their own beliefs and practices to achieve impact on learners. Apparently, entrepreneurial learning can be of different kinds. The aim of this work is to bibliometrically examine how learning emerges and co-occurs with other keywords in the extant entrepreneurship literature and its corresponding academic impact. Since learning penetrates horizontally various entrepreneurial studies, it is expected a frequent keyword in literature.

Traditionally, entrepreneurial learning is considered a cognitive process (e.g. Baron 2004; Mitchell et al. 2007). Much of the literature addresses cognition as a central process for entrepreneurial knowledge transfer. From the scienometrics perspective, Meyer et al. (2014) revealed "cognitive aspects of entrepreneurship" as one of the five major classes in entrepreneurship literature and associated with its theoretical perspectives. Thus, the cognitive entrepreneurial learning is expected with a high citation in literature. Moreover, and due to the 90s 'shift' in examining entrepreneurship in the organisational context (Landström et al. 2012), entrepreneurial learning has been largely considered as organisational in business literature (e.g. March 1991; Carayannis 1998; Zahra and George 2002). Thus, learning is expected organisational accordingly. There are also contemporary alternative streams of research which consider entrepreneurialism: (a) learnt from experience (e.g. Minniti and Bygrave 2001; Politis 2005), (b) a cognitive developmental process (Krueger 2007), and (c) a higher-level learning process (Rae and Carswell 2000; Cope 2003, 2005; Kyrö 2008; Kakouris 2015). These alternatives focus on reflection and other meta-cognitive capacities taking into account the societal environment, critical events and personal beliefs of potential entrepreneurs. Reflection has been also the key-process for double-loop organisational learning (Argyris and Schön 1978). Such considerations are close to effective career counselling practices and vocational training that aim to induce subsequent praxis of the clients/trainees. The following set of research hypotheses will be bibliometrically tested:

H3a: Learning is a frequent keyword in entrepreneurial literature compared with its other subjects.

H3b: Entrepreneurial learning is a keyword that co-occurs in literature with the terms: cognition/cognitive, organisational and experiential.

H3c: Learning attains higher academic citation when combined with cognition and/or organisational keywords compared with other forms (e.g. experiential, higher-level).

The adopted method to test the previous hypotheses is based on bibliometric data (cf. Bhuparitaju et al. 2012; Teixeira 2011; Landström et al. 2012; Meyer et al. 2014). Methodology and explanatory quantitative findings are discussed in the sequel along with implications for educational researchers, educational policies and academic publishing corporations.

Methods

In order to study the keywords and key–phrases of entrepreneurship literature, we retrieved 7726 abstracts (in total) from the SCOPUS bibliographic database (http://www.scopus.com/) under the search keyword "entrepreneurship". Leading journals in the field were included in the sample. We identified 345 articles that compound entrepreneurship and education, which are half of the 646 initial articles identified in a broader literature set by Blenker et al. (2014). Meyer et al. (2014) refer that many irrelevant article records may be retrieved when the string "entrep" is used as a filter and more systematic clearance of data is needed. In the present work, we considered "entrepreneurship" as the filtering keyword, contained in the abstract, independently of the journal's title and direct link to business venturing research. In this way we accommodate the interdisciplinary evolution of the field and collect sparse bibliographic data that a new scientist will meet entering the field. Since the present work focuses on text mining and not on a co-citation analysis, bibliometric data were not adjusted further. In this way we obtain an explanatory pattern while a more sophisticated research to discuss the accurate academic impact of entrepreneurial education will demand the inclusion of books, theses, conference papers and other data and methods (e.g. co-citation analysis) that exceed the scope of the present article. Nonetheless, the present explanatory results can trigger more precise research in the future.

The analysed sample of abstracts spans from 1980 to 2012 and correspond to research articles, reviews or editorials. The dataset was retrieved in April 2013, i.e. a year after the newest articles dates. The evolution of the number of articles per year is shown in Fig. 1. It is clearly shown that the number of articles has grown exponentially over time. The same growth has been illustrated in the rest bibliometric studies of entrepreneurship that analysed other bibliographic datasets (Landström et al. 2012; Meyer et al. 2014). The observed growth rate for the years 2005–2010 is 12 %, the same with the WoS dataset used by Meyer et al. (2014). The subset of abstracts that include the keyword "innovation" is shown through the asterisks in Fig. 1. Similarly, abstracts including the keyword "education" are shown by the squares and those including the keyword "learning" are shown by the diamonds. All these subsets exhibit similar exponential growth; nonetheless, their systematic appearance begins after the millennium and more specifically after the year 2005.

We further analyse the keywords that classify the previous set of abstracts in bibliography. These keywords have been set either by authors or in accordance with journals' bibliographic lists. Different word frequencies and correspondences for the two different sets of keywords are compared. 2223 articles provide index keywords while 5151 articles are accompanied by author keywords (a set of 52,738 keywords). Thus, 7177 different index keywords and 11,715 author keywords were retrieved. Through text

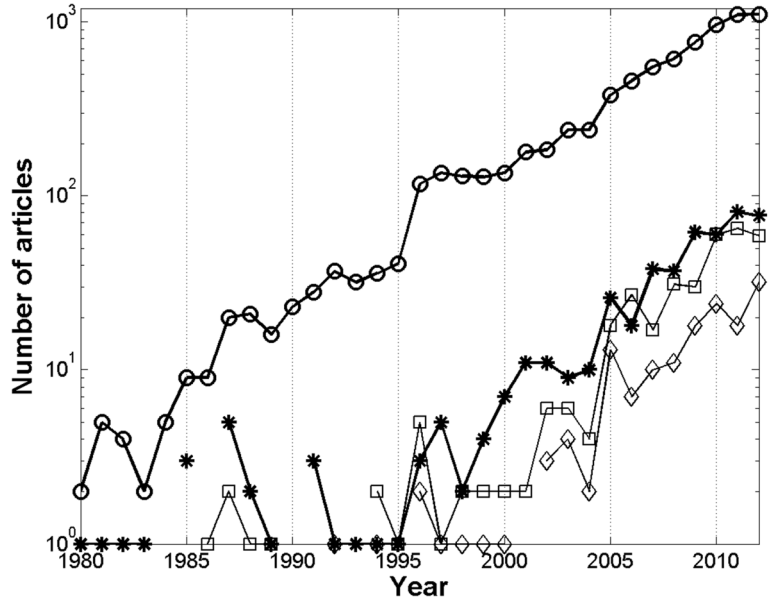

Fig. 1 Evolution of the sample's number of papers per year (since 1980). Circles correspond to the overall sample, asterisks to "innovation", squares to "education" and diamonds to "learning" keywords

mining, using the KH coder tool, word frequencies and co-occurrence networks are calculated and compared for articles' titles, keywords and abstracts. The goal is to examine the relative position of "education" and "learning" concepts amongst the rest key-concepts in entrepreneurial literature. In a further step, we retrieve and discuss citations per paper (cpp) as an indicative index for the academic impact of each concept in entrepreneurial research.

The expected word associations that concern education and learning concepts are shown in Fig. 2. Three separate clusters of words are considered for the present study. First, the learning cluster with related phrases as: experiential learning, organisational learning and higher-level learning. Relevant learning processes can refer to cognition,

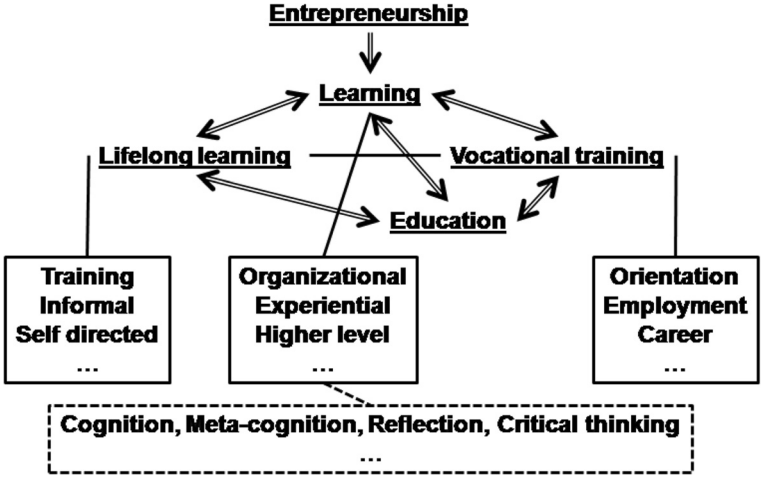

Fig. 2 Classification of expected keywords and concepts for the present study

reflection, meta-cognition or critical thinking. The lifelong learning cluster involves training, formal or informal, self-directed learning or other adult learning processes. The vocational training cluster can be considered different than lifelong learning aiming to connect education and learning with the career options and the workplace environment of the trainees. In this cluster, (self)employment is essential, along with entrepreneurial orientation or intention of trainees which also refer to nascent entrepreneurship. The education concept can be related, or not (hypothesis H2b), with learning and its proximate concepts, as learning is broader and an inherent process or real life business venturing while education concerns the systematic provision of entrepreneurial knowledge from educational bodies which can assume differently its outcomes, e.g. learning, orientation, intentions, perspectives, mindsets, etc. The classification shown in Fig. 2 is not strict. There can be various associations with other concepts (e.g. innovation, SMEs, social entrepreneurship, etc.). However, the classification of Fig. 2 is grounded on the theoretical framework of section "Theoretical framework and research hypotheses" and illustrates the expected pattern from the educational literature that needs to be scrutinized in the present bibliometric study.

Results

Bibliometric analysis of the 7726 SCOPUS sample of abstracts that appear under the search keyword “entrepreneurship” concerns: word frequencies and text mining for corpuses of titles, author or index keywords, abstracts and also citation analysis. In the first, word frequencies (section "Word frequencies") show that both education and learning appear in the top word lists. Word co-occurrence networks (section "Text mining through word co-occurrence networks") reveal certain differences between author’s and journal lists’ classifications. Articles’ titles and abstracts provide the customary use of educational and learning concepts in the extant entrepreneurial literature. Citation analysis (section "Citation indices and impact") is indicative for the impact that articles within certain clusters attain.

For the analysis of keywords that classify each paper bibliographically, “entrepreneurship” was the search keyword, and thus, it has been excluded from the sample along with the repetitive keyword “entrepreneurialism”. For the analysis of abstracts, repetitive words that appear in the top 50 word-lists and typically describe the aims and methods of articles have also been excluded (e.g. study, paper, research, new, use, model and others – 186 words in total).

Word frequencies

Word frequencies for articles’ titles, keywords and abstracts are shown in Table 1. Top-20 words are illustrated, while some representative education and learning keywords are also listed.

Education appears in the top-20 word lists for all corpuses. Especially authors, place education in the third position of the most frequent keywords and entrepreneurship education in the 14th. Learn or learning are less frequent words that do appear in the top-100 words except author keywords which show ‘learn’ in the top-20 word list. The result shows that there has been a large number of articles with educational purposes and content within the entrepreneurship literature. Such a pattern is expected since

Table 1 Word frequencies for the top-20 words

	Titles	Freq.	Index keywords	Freq.	Author keywords	Freq.	Abstracts	Freq.
1	entrepreneurship	2922	entrepreneur	1050	innovation	434	entrepreneurship	10794
2	entrepreneurial	1046	United States	337	entrepreneur	233	business	6020
3	entrepreneur	678	innovation	283	education	158	entrepreneurial	
4	business	670	commercial phenomenon	280	social entrepreneurship	149	entrepreneur	5870
5	social	549	economics	230	social capital	140	firm	5798
6	development	545	Eurasium	230	self employment	137	development	4698
7	new	509	human	207	gender	120	social	3653
8	firm	477	Europe	195	international entrepreneurship	115	economic	3575
9	innovation	469	economic development	149	China	111	venture	2933
10	case	418	industry	148	venture capital	101	market	2502
11	study	417	employment	135	corporate entrepreneurship	96	policy	2481
12	venture	371	investment	134	economic development	96	activity	2331
13	economic	327	United Kingdom	122	small business	94	innovation	2310
14	research	326	biotechnology	108	entrepreneurship education	89	growth	2309
15	capital	320	research	106	woman	87	capital	2139
16	education	320	organization/ management	100	network	82	small	1977
17	role	306	business development	97	academic entrepreneurship	76	opportunity	1827
18	enterprise	296	education	96	learn	70	country	1804
19	small	292	self employment	95	economic growth	69	enterprise	1780
20	growth	272	economic growth	93	human capital	69	economy	1758
	…	…	…	…	…	…	21. education	1687
	72. learn	92	70. learn	42	25. higher education	63	…	1660
	…	…			26. university	61	25. student	…
	80. learning	87			…	…	…	1553
					47. student	42	36. university	…
					…	…	…	1217
					109. experiential learning	23	63. higher	…
							…	805
							87. learn	…
							…	634
							90. learning	..
								623

entrepreneurship education has been a priority across educational policies and most of the relevant papers describe implementations of entrepreneurial programs and outcomes in many countries. Moreover, Landström et al. (2012) show that a significant number of articles from the "education and educational research" subject area of WoS journals cite the 'core' articles of the entrepreneurial knowledge base from 80s till now.

Their relevant position, amongst the rest subject areas, was higher in 80s (15th) and lost momentum in 90s and 00s (i.e. does not appear in the top-20 lists). A possible explanation could be that educating entrepreneurs had been a promising domain in the first, early phase (e.g. Rondstand 1987), but it was restrained during the growth phase where various shifts occurred, and struggles to obtain a high position in the on-going, 'explosive' but fragmented, 'front-end' period. These findings support hypothesis H2a and rejects hypothesis H3a. The scarcity of "learning" amongst the most frequent keywords is in accordance with Landrström and colleagues results.

Text mining through word co-occurrence networks

In Fig. 3, word co-occurrence networks for articles' index keywords (a), titles (b), author keywords (c) and abstracts (d) are illustrated. Circles are proportional to the word frequencies while different colours (different shading of grey) indicate different word clusters. Line thickness is proportional to the word associations.

Since entrepreneurial literature spans in a wide range of journals emerging from the economics and management domain, we analyse keywords arbitrarily introduced by authors (3c) separately from the ones chosen through journals' lists (3a). Within the latter set (3a), keyword "entrepreneur" dominates validating that entrepreneurship has been connected with the entrepreneur and his/her traits in 80s and early 90s (Landström et al. 2012). Meyer et al. (2014) also found "demographic and personality determinants of entrepreneurship" as one of their five distinct word clusters. Furthermore, the word appears related to regional classification keywords (right down corner). The other dominant cluster includes economics and management concepts while the keyword "education" appears separately just connected with "history" and "social change". "Self-employment" also appears connected with the "labour market". The result can be understood due to the economics macro-perspective, which focuses on regional economies, economic development and labour economics. In the micro-perspective, organisational management dominates. The result is due to the managerial shift in entrepreneurship in 90s (Landström et al. 2012). Compared with the Meyer et al. (2014) clusters, their "demographic and personality determinants of entrepreneurship", and "eclectic approaches on entrepreneurship" clearly appear in the pattern (3a). The picture is dramatically different for author keywords (3c). The most frequent keywords pertain to "innovation" and "entrepreneur", with "education" following them and been connected with the "entrepreneur" (Table 1). These keywords form different word clusters where: "entrepreneur" is connected with gender and motivation, "education" appears joint to higher education, students' intentions and academic entrepreneurship; while "innovation" is associated with social capital, creativity, networking, knowledge, learn and growth. The expected sub-cluster of internationalization of SMEs (Meyer et al. 2014 – "eclectic approaches on entrepreneurship") and their entrepreneurial orientation and performance also appears. Comparing plots (3a) and (3c), the discrepancy between author and index keywords is apparent. Entrepreneurship scholars introduce keywords different than the ones found in lists. The former are more close to the recent conception of entrepreneurship as it appears after the millennium (Shane and Venkataraman 2000). Nonetheless, "education" appears isolated from the rest entrepreneurial concepts. It emerges as a matter of university education and determinant of students' entrepreneurial

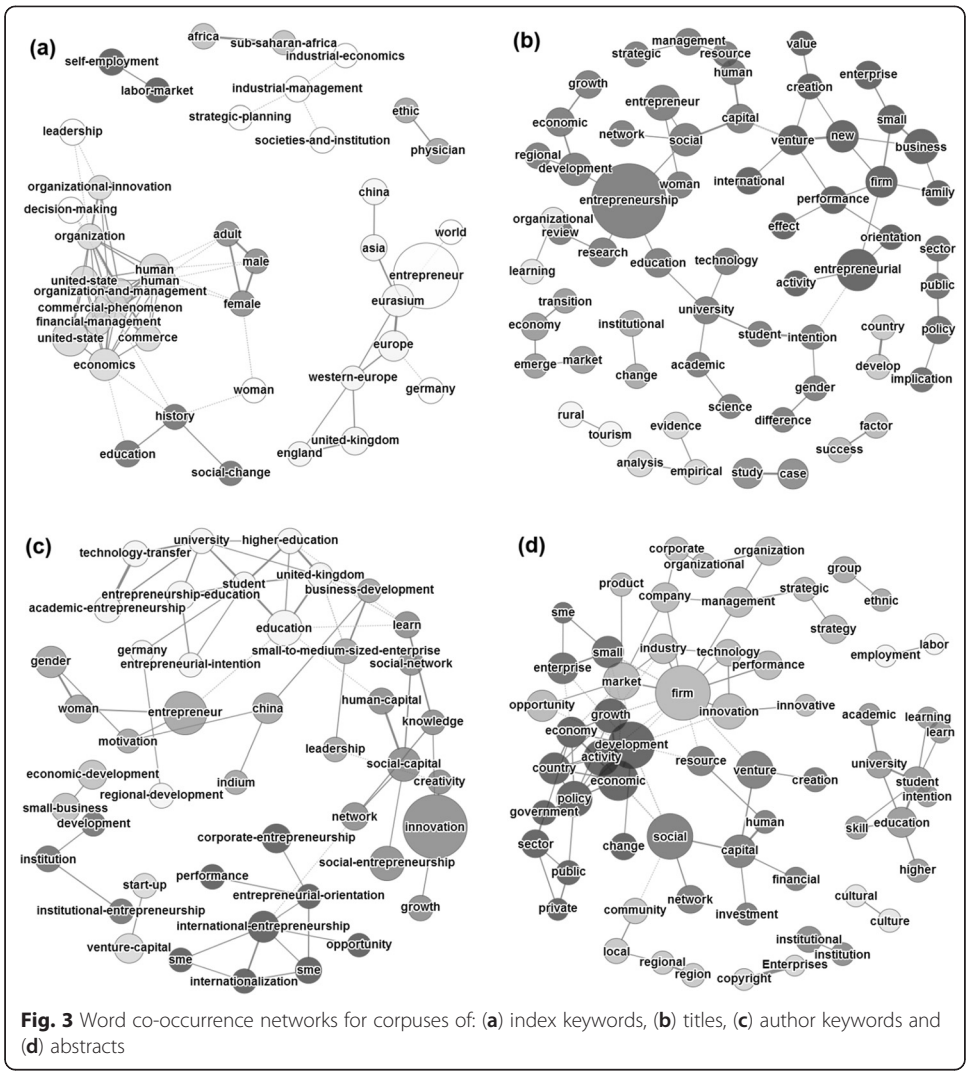

Fig. 3 Word co-occurrence networks for corpuses of: (**a**) index keywords, (**b**) titles, (**c**) author keywords and (**d**) abstracts

intentions. Such a pattern seems rather a 'bottleneck' for the large production of educational papers in entrepreneurship. Hypothesis H1 is partially supported (i.e. only students' intentions appear) while hypothesis H2b is supported.

In order to examine the content of the abstracts, we analyse words of articles' titles (3b) and abstracts (3d). Education and learning appear less frequent words in these corpuses (Table 1). In the titles' corpus (3b), "entrepreneurship" and "entrepreneurial" dominate, while word associations are similar to the author keywords (3c). "Entrepreneurial" mostly refers to the orientation and performance of SMEs, while "entrepreneurship" exhibits three certain branches, one of them been "education". Education further refers to university, science, technology and students' intentions (hypothesis H2b is supported). Notably, "learning" is mostly thought as "organisational" (hypothesis H3b is supported). This result could due to the large number of articles examining the entrepreneurial process based on the firm as the level of analysis. The latter finding is strengthened in abstracts' pattern (3d) where the word "firm" creates a cluster that includes "innovation", "industry" and "management" concepts. In the same word map, the economic growth and regional development cluster is distinctive, while "education"

forms a cluster that includes "university", "students", their "skills" and "intentions" along with "learning" (hypothesis H2b supported, hypothesis H1 partially supported). The emergent pattern can be understood bearing in mind that fostering entrepreneurial mindsets has been an educational priority after 00s in most countries. Thus, there is significant production of entrepreneurship education research which needs to be further discussed towards its content and impact. In addition, "labour" and "employment" appear connected in plot (3d) probably due to the studies of labour economists. "Culture" also appears in abstracts as it is usually discussed in entrepreneurial studies. However, these words do not appear associated with education which implies that there is attention on employment or self-employment rates and cultural issues but not as an outcome of entrepreneurial courses. Career guidance and lifelong learning, as means of bridging education with employment, are absent in the frequency analysis of the literature examined here. Hence, partial support of hypothesis H1 concerns students' intentions solely, without a rigorous connection with vocational training, career counselling and lifelong learning.

Citation indices and impact

In Tables 2 and 3, the number of citations that papers receive is summarised. For instance (Table 2), 483 articles contain both words "entrepreneurship" and "innovation" in the abstract. These papers have been cited 5631 times and the relative "citations per paper" (cpp) index is 12.43. The latter is a descriptive measure for the impact papers attain in literature. In accordance with other bibliometric studies, we assume that an increased number of citations indicates a positive impact for the corresponding article. Table 3 provides citations for articles that contain in abstracts combinations of the keywords under consideration.

The average cpp index of the total SCOPUS sample is 12. It is shown in Table 2 that "innovation", "education", "orientation/intention" and "employment" abstracts are the most populated subsets. Subsets that contain the words "learning" or "cognition/cognitive" follow. Thus, hypothesis H2a is supported while hypothesis H3a is partially supported.

Table 2 Number of papers and citation indices per keyword

Keyword	# papers	# citations (total)	# citations per paper
Entrepreneurship	7726	92765	12.00
Innovation	483	5631	12.43
Learning	150	1534	10.22
Education	345	2216	6.42
Organisational learning	14	327	23.36
Cognition / ive	147	2466	16.78
Experiential learning	8	94	11.75
Orientation / Intention	226	3931	17.40
Employment	312	3222	10.33
Vocational training	6	45	7.50
Career	71	475	6.69
Training	68	246	3.62
Lifelong learning	3	6	2.00

Table 3 Number of articles, number of citations (in parentheses) and number of citations per paper (italics)

	Innovation	Education	Learning	Cognition	Orientation/Intention
Education	9 (32) *3.56*				
Learning	15 (207) *13.80*	28 (95) *3.39*			
Cognition	5 (5) *1.00*	4 (55) *13.75*	5 (99) *19.80*		
Orientation/Intention	10 (229) *22.90*	17 (97) *5.71*	7 (153) *21.86*	7 (29) *4.14*	
Employment	9 (117) *13.00*	14 (71) *5.07*	1 (2) *2.00*	4 (11) *3.75*	4 (2) *0.50*

Notably, the subset of "education" exhibits the lowest attention (cpp = 6.42). Hence, hypothesis H2c is supported. The subset of "learning" shows cpp = 10.22 which could be expected since learning includes surveys for educational purposes but also for the study of real life business venturing. Concerning different types of learning, the "organisational" one receives the highest impact (cpp = 23.36), the "cognitive" one follows (cpp = 16.78) with the "experiential" one third in the list (cpp = 11.75). Notably, "organisational learning" receives a double cpp index than the overall sample. This result supports the hypothesis H3c. As already mentioned in section Theoretical framework and research hypotheses, the previous result can be understood due to the large number of articles which study entrepreneurship focusing on the firm as the entity of analysis. Moreover, there is a strong tradition in cognitive methods of learning while experiential learning is a relatively 'new' stream (8 articles) which focuses to the entrepreneur and his/her performance as an individual. The 'experiential learning' stream also includes studies for in-class entrepreneurship education based on learning-by-doing and receives almost the average cpp.

The lower panels of Table 2 refer to the connection of entrepreneurship with career planning. In this domain, "orientation/intention" surveys receive the largest attention (cpp = 17.40). However, these studies may refer to the individual or the firm level of analysis. The "employment" subset follows with cpp = 10.33. At this point, we cannot distinguish between general employment studies (i.e. from the labour economics) and self-employment which is an implicit form of entrepreneurship. A relevant remark could only refer to the non-taken-for-granted connection of entrepreneurial intentions and self-employment rates with the outcomes of entrepreneurial education. Vocational training encompasses only 6 articles with cpp = 7.5, while the "training" subset attains a low ccp = 3.62. "Lifelong learning" encompasses 3 papers with a 'poor' cpp = 2.

Furthermore, in Table 3, subsets of abstracts which encompass two more keywords beyond entrepreneurship are examined. Notably, articles which compound "orientation/intention" with either "innovation" (cpp = 22.9) or "learning" (cpp = 21.86) attain the highest impact. As seen from word co-occurrence networks (Fig. 3), "orientation" combined with "innovation" (or "learning") refers to the firm as the entity of analysis. Thus, it follows a dominant stream of organisational research which receives high impact but it is irrelevant to any educational outcome. Therefore, academic attention is given to how learning emerges in firms and how they can be more innovative. In contrast, "intention/orientation" combined with "education" ("orientation" here refers to students' intentions) attains a much less cpp = 5.71 (support of hypothesis H2c). Hence, more rigorous research is needed in the latter direction. Entrepreneurship "education" illustrates 4 articles with higher impact (cpp = 13.75) when combined with "cognition". On the other hand, "cognition" illustrates a remarkable low impact (cpp = 1) when

combined to “innovation”. This result can be understood considering that most studies for innovation consider it an organisational tool for the firm’s growth and performance or refer to creativity, intuition or other personal “aptitudes” of individuals that could hardly be thought as cognitive skills. In addition, “education” along with “learning” shows a low cpp = 3.39 while “learning” combined with “cognition” receives a high cpp = 19.80. The finding from Table 3 is that entrepreneurial learning is thought predominately cognitive and organisational (support of hypothesis H3c); and thus, it has been under-researched towards its significance as an outcome in educational programmes especially when such programmes aim to focus on innovative entrepreneurship. Research towards entrepreneurship education/learning processes and career planning/employment has also been scarce.

Limitations of the research

A certain limitation of the present survey is the omission of books, edited volume chapters, theses and conference papers in the analysed sample. Since entrepreneurship is a new field of research, books are important as they present various influential perspectives and elaborate complex arguments (Landström et al. 2012). The use of a single bibliographic database (SCOPUS) is also a weakness for the generalisation of the results. Another limitation is the lack of a bibliometric algorithm to justify the evolution of cpp over time. Hence, older articles receive higher citation rates than newer ones and the analysis of impact becomes detrimental for recent publications. In addition, the present analysis lacks identification of cross-citations and the formation of author clusters (e.g., Landström et al. 2012). Therefore, present results can be considered explanatory and indicative but primitive; i.e. a first step for further analysis. Albeit, confined in the educational context, present results are indicative for research ‘gaps’ that scholars may have to consider in their research.

Discussion and implications

The overall picture of the present analysis is in agreement with previous bibliometric studies in entrepreneurship (Landström et al. 2012; Meyer et al. 2014). The present focus on education and learning led to support of hypotheses H2a,b,c for education and support of hypotheses H3b,c, for learning. Hypothesis H3a is partially supported as there is research work that refers to learning but it is not as much as expected. In section "Results", it was figured out that “learning” is less frequent in bibliography than “education” but receives a much higher attention and impact. Hypothesis 1 is partially supported as education is observed related with students’ entrepreneurial intentions but not with vocational training and lifelong learning.

Given the bibliometric results of Tables 2 and 3, research referring to higher-level learning, as introduced by Cope (2003, 2005), is rare in entrepreneurship literature. Scholars may find reflective learning processes only in the context of organisational learning (Argyris and Schön 1978) which has been introduced and studied for a long period in management research. Keywords as “critical thinking” and “meta-cognition” (Fig. 2) gave no results within the sample. We propose that the incorporation of reflective, meta-cognitive or higher-level learning processes in research may link to fostering entrepreneurship through lifelong learning (or vocational training) or to effective incorporation of entrepreneurship in traditional career counselling practices. This is

because higher-level learning deals with assumptions and stereotypes of learners' populations and also with cultural issues usually suggested as determinants of nascent entrepreneurship and local business initiatives. This concerns the reflective learning process, and thus the 'situated' or the 'existential' learning perspectives addressed recently by Neergaard et al. (2012). Effects of critical thinking combined with experiential learning are also discussed in Kakouris and Ketikidis (2012) while Berglund and Johansson (2007) discussed critical pedagogy perspectives in entrepreneurship and regional development.

For the domain of vocational training and career counselling, there are implicit keywords in the list. For instance, "entrepreneurial intention" and "entrepreneurial orientation" refer to the tendency of individuals, or other entities, to behave entrepreneurially. "Orientation" refers more to firms but it also concerns individuals in some cases. The literature includes a variety of surveys, mostly quantitative, that measure the inclination of people to become entrepreneurs, their entrepreneurial self-efficacy, along with studies of nascent entrepreneurship. However, this is not necessarily an outcome of vocational training or entrepreneurship education and needs further research and consideration. Similarly, most of employment due to entrepreneurship refers to "self-employment". Self-employment has been an equivocal form of entrepreneurship as the latter refers to start-ups and new firms with more than one employee. Especially in innovative entrepreneurship studies, self-employment is usually excluded. Hence, research in this direction needs to focus on the way that entrepreneurship is employed in career planning. Implications for educational agencies and educational policy makers concern the expected goals from '*fostering entrepreneurial mindsets*'. Are some optional courses and programmes, at the higher education level, sufficient to achieve the expected goals? Besides, some courses are dedicated to entrepreneurship while others just incorporate "elements of entrepreneurship" in formal curricula just to implicitly inspire students towards entrepreneurship. Our suggestion is that closer theoretical ties with vocational training and career counselling are needed and such a perspective has motivated the present survey. The findings manifest a 'loose' connection of formal education with the informal one and career counselling in literature. Future scheduling for entrepreneurship policies has to consider the present insight in order to facilitate a possible integration of entrepreneurship education and its outcomes. Such a possible integration is clearly stated amongst the objectives of the relevant grey literature reports but is not adequately supported theoretically by rigorous academic research.

It also emerges that experiential learning receives impact within the entrepreneurship literature. An increasing number of entrepreneurial courses adopts learning-by-doing pedagogies as the most relevant to real life entrepreneurship where entrepreneurs have to learn from their own practice (Rasmussen and Sørheim 2006). The notion of 'learning from failure' is representative for trial-and-error processes during the founding and growing phases of a new firm (Shepherd 2003). Besides, the lack of an autonomous and concise entrepreneurial theory (Bygrave and Hofer 1991), able to support cognitive approaches in learning, is supportive to experiential methods. Consequently, many new entrepreneurial courses aim to simulate the real life entrepreneurial environment as to exploit experience as a means of learning, and thus, accommodate a situated or an existential pedagogical perspective (Neergaard et al. 2012). Towards this direction, reflective processes become essential and further connection of experiential with higher-level

learning is needed. Implications for entrepreneurship educational researchers concern the adoption and examination of the entire spectrum of learning theories and educational psychology approaches, and especially their relevance to education, in order to consistently incorporate learning into the business venturing processes.

From the present findings, the question "Why entrepreneurship education appears to receive low citation within the extant literature?" arises. From a private communication with an editor of a leading journal in the field, it came out that entrepreneurship education has been excluded from the journal's scope. Given the important role of education, especially for developing countries, to provide knowledge and skills to youth populations, the previous question becomes crucial for educators and educational policy makers. The results from projects that focus on the impact of entrepreneurship education are expected to provide some insights relevant to the aforementioned question. A possible influx of educational psychology researchers in the field may also provide crucial expertise to answer the question (Neergaard et al. 2012). Apparently, more concentrated and well-grounded research is needed in this direction (Hisrich et al. 2007).

Finally, a clear finding from the present survey concerns the discrepancy between author and index keywords in the field. Authors set keywords more close to the understanding of entrepreneurship as it evolves after 2005. They also use "education" and "learning" keywords high in the relevant keyword list (Table 1). On the other hand, journals use keyword lists more close to the traditional economics perspective of entrepreneurship, i.e. prior to the millennium and the growth phase of entrepreneurship as an autonomous field of research (Shane and Venkataraman 2000). The discrepancy is expected and it is due to the aims and scopes of journals that are mostly classified within the economics domain. It is well known that entrepreneurship has evolved as a subject of economics or management and relevant articles of its knowledge base span in a wide range of journals and books (Landström et al. 2012). Nevertheless, the observed keyword discrepancy is expected to be waived either by possible modifications of relevant lists or by the appearance of new journals in the field. Implications for academic publishers concern their essential role in creating a harmonized academic space for the new and fast growing research stream for entrepreneurship and entrepreneurship education.

Conclusion

According to educational policies, entrepreneurship education undergoes a further expansion phase in order to include wider populations of trainees. At the same time, its citation rates appear low compared with other sub-themes and its contribution to nascent entrepreneurship and start-ups is under investigation. Hence, entrepreneurial learning induced in various groups of learners becomes central in relevant official documents and guidelines (e.g. European Commission 2012b). Beyond education and training, entrepreneurial learning is important for real entrepreneurs' trajectories and performance. If so, learning is an inherent component for entrepreneurship theory building. And thus, higher-level learning is expected to be considered in the entrepreneurial practice and research beyond the traditional cognitive approaches. In the present article, we examined the bibliometric evidence for learning and education studies in connection with other topics of entrepreneurship.

Bibliometric results from the SCOPUS database show that there is poor evidence for advanced learning processes in entrepreneurship research. An increasing number of articles deal with education; however, the relevant citation is still low in the examined literature. Especially in the context of innovative entrepreneurship education there is little research referring to learning processes. This result may due to the confrontation with creativity and its complex nature. And therefore, a widely adopted statement is that "*entrepreneurship education is a combination of cognitive and non-cognitive skills*". Even so, the question "what are the appropriate pedagogies for non-cognitive skills?" remains open to research. Furthermore, there is little research towards the connection of the entrepreneurial intention/orientation with relevant education taken by the potential entrepreneurs and subsequent longitudinal follow-up to illustrate if the educated individuals do start new firms. Besides, entrepreneurship has not been extensively studied in connection with career counselling and employment. Present results indicate that further research is needed as to reveal a more concise picture of the 'fostering entrepreneurial mindsets' educational process. Towards this direction, learning is a crucial outcome that involves meta-cognitive processes beyond the cognitive ones. We maintain that considering learning as a higher-level process, entrepreneurship will be facilitated in the contexts of lifelong learning, vocational training and career counselling. Since the relevant existing literature lacks an adequate academic discourse on these subjects, we expect the entrepreneurship community to actively incorporate higher-level learning processes in the academic discourse (Cope 2003).

Finally, the present findings are consistent with previous bibliometric studies in entrepreneurship and imply certain considerations for educational researchers, educational bodies and academic publishers. Especially for developing countries, which aim to systematically foster entrepreneurship, the impact of relevant educational programmes is of high importance; and thus, a closer view of educational processes and learning is needed to ameliorate the outcomes of entrepreneurial policies for endogenous economic development and employability.

Endnotes

[1]http://badm.au.dk/research/research-groups/icare/pace/

[2]Relevant documents can be found at "Enterprise and Industry" directorate of European Commission (European Commission. Enterprise and Industry directorate. Education and training for entrepreneurship - reference documents. http://ec.europa.eu/education/policy/strategic-framework/entrepreneurship_en.htm. Accessed 18 November 2014).

[3]Lifelong learning settings are those provided systematically by Adult Education agencies. We consider them a type of formal (or non-formal) education as far as they are structured (or semi-structured) and based on pedagogies. Lifelong learning settings, usually referred in the EU grey literature, differ from pure informal or self-directed learning that occurs in the lifetime of an individual.

Competing interests
The authors declare that they have no competing interests.

Authors' contributions
Both authors read and approved the final manuscript.

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